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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/620,782 | 07/15/2003 | Dirk J. Sundt | 501085.02 | 1121 |

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| EXAMINER |
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LOKE, STEVEN HO YIN

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| ART UNIT | PAPER NUMBER |
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2811

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

11A

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|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/620,782 | Applicant(s) SUNDT ET AL. | |
| | Examiner Steven Loke | Art Unit 2811 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-37 and 39-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25,26,30-37 and 39-41 is/are rejected.
- 7) ☒ Claim(s) 27-29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
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| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. Claims 30-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification never discloses the first opening dimension adjacent the trench approximately equal to the trench opening dimension as claimed in claim 30.

The specification never discloses the trench having sidewalls at a first angle relative to a surface of the substrate and further having sidewalls at a second angle relative to the surface of the substrate as claimed in claim 30.

The specification never discloses the opening having a first dimension along the first side approximately equal to the trench opening dimension as claimed in claim 33.

2. Claim 29 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 29 is directed to the intermediate product in fig. 3G. However, claim 25, the parent claim of claim 29, is directed to the intermediate product in fig. 3E. Claim 29 is failing to further limit the subject matter of claim 25.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 25, 26, 37 and 39 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Carver.

In regards to claim 25, Carver shows all the elements of the claimed invention in fig. 6C. It is a semiconductor structure, comprising: a trench [46] formed in a substrate [35]; a first layer [32] of a first material (silicon dioxide) formed over the substrate and having a tapered opening [42] therethrough over the trench, the tapered opening having a first dimension on a first side adjacent the trench less than a second dimension on a second opposite side of the first layer; and a mask layer [34] (used to form the trench [46]) formed over the first layer and having an opening [38] therethrough having a dimension less than the second dimension of the tapered opening of the first layer [32].

In regards to claim 26, Carver further discloses the tapered opening [42] of the first layer [32] undercuts (region [44]) the opening of the mask layer [34].

In regards to claim 37, Carver shows all the elements of the claimed invention in fig. 6C. It is a semiconductor structure, comprising: a trench [46] formed in a substrate [35], the trench having an opening with a trench opening dimension; a mask layer [34] having an opening [38] therethrough and located over the trench, the opening in the mask layer having a mask layer opening dimension; and a first layer [32] interposed between the substrate [35] and the mask layer [34], the first layer having an opening [42] undercutting the opening [38] of the mask layer, the opening [42] in the first layer having a dimension adjacent the mask layer greater than a dimension adjacent the substrate and greater than the mask layer opening dimension.

In regards to claim 39, Carver inherently discloses the materials from which the first layer and the mask layer are formed can be selectively etched with respect to one another because the material of the first layer is different from the material of the mask layer.

5. Claims 37 and 39-41 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Peidous et al.

In regards to claim 37, Peidous et al. show all the elements of the claimed invention in fig. 5. It is a semiconductor structure, comprising: a trench [35] formed in a substrate [31], the trench having an opening with a trench opening dimension; a mask layer [34] having an opening therethrough and located over the trench, the opening in the mask layer having a mask layer opening dimension; and a first layer (a composite layer [32, 33]) interposed between the substrate [31] and the mask layer [34], the first layer having an opening [36] undercutting the opening of the mask layer, the opening in the first layer having a dimension adjacent the mask layer greater than a dimension adjacent the substrate and greater than the mask layer opening dimension.

In regards to claim 39, Peidous et al. inherently disclose the materials from which the first layer and the mask layer are formed can be selectively etched with respect to one another because the material of the first layer is different from the material of the mask layer.

In regards to claim 40, Peidous et al. further disclose the mask layer [34] comprises a layer formed from a silicon oxide material.

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In regards to claim 41, Peidous et al. further disclose the first layer [32, 33] comprises a layer [33] formed from a silicon nitride layer.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 30-32 insofar, as in compliance with 35 USC 112, are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Huang.

In regards to claim 30, Huang shows all the elements of the claimed invention in fig. 5b. It is a semiconductor structure, comprising: a trench [4] formed in a substrate [10], the trench having sidewalls at a first angle (an angle larger than 90 degrees) relative to a surface of the substrate and further having a trench opening dimension; and a first layer [14] of a silicon nitride material formed over the substrate and having an opening therethrough over the trench, the opening having a first opening dimension adjacent the trench approximately equal to the trench opening dimension and further having sidewalls at a second angle (right angle) relative to the surface of the substrate that is unequal to the first angle.

In regards to claim 31, Huang further discloses a layer of insulating material [16] filling the trench.

In regards to claim 32, Huang further discloses a pad oxide layer [12] interposed between the first layer [14] and the substrate [10], the pad oxide layer having an opening therethrough over the trench.

8. Applicant's arguments filed 10/17/05 have been fully considered but they are not persuasive.

It is urged, in page 7 and 8 of the remarks, that Peidous shows the dimensions of the resulting openings through the silicon nitride layer 33 do not have a dimension adjacent the thin oxide layer 34 greater than a dimension adjacent the substrate 31 and also greater than the opening through the thin oxide layer 34. However, Peidous shows the dimensions of the resulting openings through the composite layer [32, 33] do have a dimension adjacent the thin oxide layer 34 greater than a dimension adjacent the substrate 31 and also greater than the opening through the thin oxide layer 34. Therefore, Peidous et al. meet the limitation of the claimed invention.

9. Claims 27 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: The first major difference in the claims not found in the prior art of record is the first material comprises a silicon nitride layer. The second major difference in the claims not found in the prior art of record is the mask layer comprises a layer of a silicon oxide material.

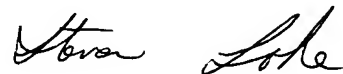
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (571) 272-1657. The examiner can normally be reached on 8:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sl
November 26, 2005

Handwritten signature of Steven Loke in cursive script.